WHAT IS CLAIMED IS:

1. A method of taking measurements relating to a subterranean formation, comprising automatically compressing measurements data at variable compression rates as the measurements are taken.

2. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the compression rates are varied depending on external constraints of a measurement process.

3. A method of taking measurements relating to a subterranean formation according to claim 2, wherein the external constraints comprise one or more of logging speed, drilling speed, telemetry bandwidth, and data size per distance.

4. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the variable compression rates comprise a combination of lossless compression and lossy compression.

5. A method of taking measurements relating to a subterranean formation according to claim 4, wherein the lossless compression comprises:

compressing the measurements by linear predictive coding;

compressing the measurements by differential coding;

determining which of the linear predictive and differential coding provides higher compression;

reporting only the higher compression measurements.

6. A method of taking measurements relating to a subterranean formation according to claim 4, wherein the lossless compression comprises:

segmenting the measurements into smaller blocks;

compressing the segmented blocks by linear predictive coding;

compressing the segmented blocks by differential coding;

determining which of the linear predictive and differential coding provides higher compression;

reporting only the higher compression segmented blocks.

7. A method of taking measurements relating to a subterranean formation according to claim 6, wherein the segmenting comprises applying fixed-length windows to the measurements.

8. A method of taking measurements relating to a subterranean formation according to claim 6, wherein the segmenting comprises segregating different components present in the measurements.

9. A method of taking measurements relating to a subterranean formation according to claim 8, wherein the different components are segregated by detecting a first break of different components present in a waveform.

10. A method of taking measurements relating to a subterranean formation according to claim 4, wherein the lossy compression comprises quantization.

11. A method of taking measurements relating to a subterranean formation according to claim 10, wherein the quantization comprises calculating a quantization step that maximizes compression ratio while maintaining at least a predetermined signal-to-compression-noise ratio.

12. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the measurements comprise logging measurements.

13. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the measurements comprise logging-while-drilling measurements.

14. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the measurements comprise electromagnetic or resistivity measurements.

15. A method of taking measurements relating to a subterranean formation according to claim 1, wherein the variable compression rates comprise a first range of compression rates for measurement signals having an amplitude within a first range, and a second range of compression rates for measurement signals having an amplitude within a second range.

16. A method of taking measurements relating to a subterranean formation comprising applying an algorithm that automatically varies a data compression rate of the measurements relating to a subterranean formation.

17. A method of taking measurements relating to a subterranean formation according to claim 16, wherein the algorithm compresses the measurements according to two or more data compression methods in parallel and reports only data having the highest compression rate.

18. A method of taking measurements relating to a subterranean formation according to claim 16, wherein the measurements comprise logging measurements and the algorithm automatically determines the data compression rate necessary to maintain a substantially constant logging rate.

19. A method of taking measurements relating to a subterranean formation according to claim 16, wherein the data compression rate comprises a combination of lossless and lossy compression.

20. A method of taking measurements relating to a subterranean formation according to claim 19, wherein the lossless compression comprises:

segmenting the measurements into blocks;

compressing the segmented blocks by linear predictive coding;

compressing the segmented blocks by differential coding;

determining which of the linear predictive and differential coding provides higher compression;

reporting only the higher compression segmented blocks.

21. A method of taking measurements relating to a subterranean formation according to claim 16, wherein the measurements comprise logging-while-drilling measurements.

22. A method of taking subterranean measurements comprising:

(a) determining an approximate telemetry bandwidth;

(b) assigning a minimum acceptable signal-to-compression-noise ratio;

(c) creating multiple modes of data compression with a lossless lower mode and a lossy upper mode at extents of the multiple levels;

(d) compressing measurements taken according to a default compression rate;

(e) comparing a signal-to-compression-noise ratio of the compressed measurements to the minimum acceptable signal-to-compression-noise ratio;

(f) changing the compression mode to a higher compression rate of no higher than the lossy upper mode extent if the signal-to-compression-noise ratio is above the minimum acceptable signal-to-compression-noise ratio;

(g) changing the compression mode to a lower compression rate of no lower than the lossless lower mode extent if the signal-to-compression-noise ratio is below the minimum acceptable signal-to-compression-noise ratio.

23. A method of taking subterranean measurements according to claim 22, further comprising:

(h) repeating steps (d) – (g) multiple times.

24. A method of taking subterranean measurements according to claim 22 wherein the measurements comprise waveforms, and further comprising repeating steps (d) – (g) for each waveform.

25. A method of taking subterranean measurements according to claim 22, wherein the multiple modes of data compression are quantized.

26. A method of taking subterranean measurements according to claim 22 wherein the default compression rate initially comprises the lossless lower mode.

27. A method of taking subterranean measurements according to claim 22, wherein at least one of the multiple compression modes comprises:

segmenting the measurements into blocks;

compressing the segmented blocks by linear predictive coding;

compressing the segmented blocks by differential coding;

determining which of the linear predictive and differential coding provides higher compression;

reporting only the higher compression segmented blocks.

28. A method of taking subterranean measurements according to claim 22, wherein the measurements comprise one or more of: logging measurements; logging-while-drilling measurements, electromagnetic measurements, and resistivity measurements.

29. A method of taking measurements relating to a subterranean formation comprising automatically compressing measurement data at variable rates to provide data of at least a predetermined quality at a substantially constant logging speed.

30. A method of taking measurements relating to a subterranean formation according to claim 29, wherein the variable compression rates comprise at least one lossless compression rate and at least one lossy compression rate.

31. A method of taking measurements relating to a subterranean formation according to claim 30, wherein the at least one lossless compression rate is achieved by:

segmenting the measurements into blocks;

compressing the segmented blocks by linear predictive coding;

compressing the segmented blocks by differential coding;

determining which of the linear predictive and differential coding provides higher compression;

reporting only the higher compression segmented blocks.

32. A method of taking subterranean measurements comprising:

evaluating incoming subterranean measurement data;

automatically determining whether or not to compress the data losslessly or lossly.

33. A method of taking subterranean measurements according to claim 32, wherein the automatically determining comprises:

compressing the incoming subterranean measurement data at a default compression rate;

comparing a signal-to-compression-noise ratio of the compressed data to a predetermined minimum signal-to-compression-noise ratio;

changing the default compression rate to lossless if the signal-to-compression-noise ratio of the compressed data is less than the predetermined minimum signal-to-compression-noise ratio;

changing the default compression rate to lossy if the signal-to-compression-noise ratio of the compressed data is greater than a sum of the predetermined minimum plus and a predetermined additional factor.

34. A method of taking measurements comprising:

compressing measurement data with a linear predictive coding function;

compressing the measurement data with a differential coding function;

determining which of the linear predictive coding and differential coding functions provides higher compression;

reporting only the higher compression data.

35. A method comprising taking measurements according to claim 34, wherein the compressing of the measurement data by the linear predictive coding and differential coding functions is performed in parallel.

36. A method comprising taking measurements according to claim 34, further comprising segmenting the measurements into blocks.

37. A method comprising taking measurements according to claim 36, wherein the segmenting comprises applying fixed-length windows to the measurements.

38. A method comprising taking measurements according to claim 36, wherein the segmenting comprises segregating different components present in the measurements.

39. A method comprising taking measurements according to claim 38, wherein the different components are segregated by detecting a first break of different components present in a waveform.

40. A method of manipulating data comprising compressing the data in parallel by multiple compression methods, comparing the compressed data, and reporting only the compressed data with the highest compression rate.

41. A method of manipulating data according to claim 40, wherein the compressing by multiple compression methods further comprises:

compressing the data by linear predictive coding; and

compressing the data by differential coding.

42. A method of manipulating data according to claim 41, further comprising segmenting the measurements into blocks prior to compressing.

43. A system for taking measurements relating to a subterranean formation, comprising:

a measurement tool;

a computer in communication with the measurement tool;

a set of instructions executable by the computer that, when executed, automatically compresses measurement data at variable compression rates as the measurements are taken.

44. A system according to claim 43 wherein the system is a logging system, a logging-while-drilling system, an electromagnetic measurement system, or a resistivity measurement system.

45. A computer readable storage device encoding a program of instructions including instructions for:

automatically compressing measurement data related to a subterranean formation at variable compression rates as the measurements are taken.